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ABSTRACT

Factors that affect work outcomes of high school youth and effects of the characteristics of the school that a youth attends on employer demand were studied. It was hypothesized that employers use the quality of the school as a proxy for accurate information about likely productivity of prospective employees. Four dependent variables were examined--hours of work per week, labor force participation, wage rate, and unemployment. A model of hours worked and labor force participation was derived from utility theory of labor supply. Data from 28,000 secondary and postsecondary seniors showed that wage and nonwage benefits of work tended to increase the supply of hours of teenage youth attending school. Commitment to schooling tended to reduce the hours worked. Empirical tests of the school-effects hypotheses failed to support them. These results may have been due to the relatively homogeneous quality of high schools within the geographical limits from which employers typically hire teenage workers. Findings regarding the effects of other school variables were that attending a vocational or private school increases one's wages, cooperative education and work study tend to improve one's experience in the part-time youth labor market, and black students experience higher unemployment. (YLB)

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EFFECTS OF INDIVIDUAL AND SCHOOL CHARACTERISTICS ON PART-TIME WORK OF HIGH SCHOOL SENIORS

Technical Report

Studies in Employment and Training Policy: No. 5

by

Lawrence Hotchkiss
John H. Bishop
John Gardner

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FOREWORD

Part-time work while attending high school is an increasingly important aspect of young peoples' lives. There is evidence that part-time work affects commitment to school and home, and alters important attitudes and behavior. Other evidence suggests that part-time work while in secondary school affects employment outcomes after leaving school. Consequently, it is important to understand processes that affect work experience of high school students. The National Center for Research in Vocational Education, therefore, is pleased to report this study of part-time work experience of high school youth.

Recognition is due to the authors, Lawrence Hotchkiss, John Bishop, and John Gardner. Special thanks are due to Richard Campbell, Duane Alwine, and Morgan Lewis for their scholarly reviews of this report and to Warren Simmons of the National Institute of Education for his continued support. The diligent work of Jacque Masters in typing many revisions of the report is much appreciated. Final edit of the manuscript was done by Catherine King-Fitch of the National Center editorial staff; the quality of the report has benefited from her careful work.

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EXECUTIVE SUMMARY

This report is a study of factors that affect work outcomes of high school youth. Four dependent variables are examined--hours of work per week, labor force participation, wage rate, and unemployment. A model of hours worked and labor force participation is derived from utility theory of labor supply. Effect estimates calculated from ordinary least squares and two stage least squares support the theory. It is found that wage and nonwage benefits of work tend to increase the supply of hours of teenage youth attending school. Commitment to schooling, in contrast, tends to reduce the hours worked by teenagers.

A second aspect of the report is based on reasoning about factors that affect employer demand for youth. It is hypothesized that employers use the quality of the school a youth attends as a proxy for accurate information about likely productivity of prospective employees. If this hypothesis is true, then indicators of the quality of the school a youth attends should predict the wage s/he can command and the risk of unemployment. Empirical tests of the school effects hypotheses fail to support them however, whether ordinary least squares or two stage least squares estimates are examined. It is suggested that the reason for these results may in part be due to the relatively homogeneous quality of high schools within the limited geographical limits from which employers typically hire teenage workers.

Effects of several variables that are related to policy are examined in this report. Noteworthy among these findings are: attending a vocational high school or a private school increases one's wage by thirteen cents an hour. School programs such as co-op education and work study tend to improve one's experience in the part-time youth labor market. Attending a school that is under court order to desegregate does not have disruptive effects on work experiences during school, and may tend to improve those work experiences. Just as being black is a disadvantage in the adult world, it also is a disadvantage to teenagers' experiences in the youth labor market. The most serious outcome of being black is a 13 percent higher chance of experiencing unemployment. All of these effect estimates were carried out under controls for an extensive set of background, abiliity, and geographic location variables.

INTRODUCTION

Despite the high rates of unemployment experienced by many groups of youth, there has been a steady increase in the propensity of youth to work part-time while in high school. The percentage of the sixteen-year-old males attending school who have jobs has risen from 4 percent in 1940 to 27 percent in 1970. For sixteen-year-old females attending school, the employment rate has risen from 1 percent to 16 percent (Greenberger and Steinberg 1981). This employment provides both the youth and their families with a supplementary source of income. It is also an important mechanism for socialization of youth into adult roles (Steinberg et al., 1982).

A number of studies show that in-school employment is associated with greater employment and higher wage rates after the youth leave high school (Stephenson 1981; Meyer and Wise 1980). Ellwood (1981) examines the causal structure of the association between in-school work and later labor market success. He finds that, while the association in part reflects unmeasured abilities and tastes that tend to cause youth to work more both during and after school, there is also an important causal element to the association. A number of blue-ribbon panels have argued that the school-to-work transition can be eased by giving youth greater labor market experience while in high school (President's Science Advisory Committee 1973; National Panel on High School and Adolescent Education 1976; National Commission on Youth 1980; Carnegie Commission on Policy Studies in Higher Education 1980).

If, as suggested by the evidence just cited, part-time work while attending high school influences work attitudes and postschool success in the labor market, then it is pertinent to investigate factors that influence important features of part-time work experience, such as wage rate, hours of employment, unemployment, and presence in the labor force. This report presents exploratory analyses designed to identify antecedents of work experience during high school. First, an economic model of labor supply is developed and tested. This model reflects fairly faithfully the underlying neoclassical model of labor-leisure choice but expands it in two important respects. Time is divided into three segments--time at work, time at school, and leisure time--rather than the usual two segments--labor and leisure. Also, nonwage compensation for work time is incorporated explicitly into the model, and valuation of schooling is incorporated into the model. The result is a formal model including a representation of how work and school compete for one's time.

The second aspect of the paper studies the effects of the characteristics of the school a youth attends on work-related variables, such as wage and employment status. The rationale underlying the study of school effects on part-time work experience rests on informal theorizing regarding employer demand for services of youth who are enrolled in secondary school. It is argued that employers use school characteristics, such as average deportment of students and overall assessment of school quality, as substitutes for complete information on the individual characteristics of potential employees. Empirical investigation using the High School and Beyond (HSB) data, however, do not support these suppositions.

Two reasons led to the focus on school characteristics. First, education is an important area of public policy. Therefore, identification of school characteristics that influence part-time work experience of youth would provide policymakers with useful clues about how to implement goals related to work of high school youth. Second, limitations of data in the HSB precluded use of more direct measures of employer demand for services of high school youth.

In some instances, the statistical estimation involving school characteristics is formally equivalent to what has been termed "contextual analysis." Since contextual analysis has been a subject of strong debate in the sociological literature, a subsection within the "Methods" section of this paper is devoted to a review and evaluation of the main arguments in the debate.

THEORETICAL FRAMEWORK

Background

According to human capital theory (Becker 1975), schooling is an investment in the development of characteristics that directly influence productivity on the job. Although the theory encompasses a wide range of traits that may affect productivity, the focus tends to be on skills rather than job-related attitudes.[1] Others argue that the main function of schooling is to develop habits of industry among prospective workers (Bowles and Gintis 1975). Thurow (1975) argues that schooling is a certification process whereby receipt of a certificate or diploma signals employers as to one's market value. Position in the employment queue is determined partially by formal schooling. The basic mechanism in this process, according to Thurow, is that years of schooling (and other easily observable traits, such as race and gender) serve as surrogate measures of probable productivity.

The human capital viewpoint is predicated on the assumption that wages equal the marginal product of each employee (Becker 1975; Thurow 1970). Exact correspondence between wage rate and marginal product, however, presumes a perfectly competitive labor market, a presumption that is challenged by casual observation and by a growing number of theorists (Doeringer and Piore 1971; Kerr 1954; Bluestone 1970; for review and evaluation, see Cain 1976; Hodson and Kaufman 1982). The theory that challenges neoclassical economic theory of labor markets is variously termed dual labor market theory, segmented labor market theory, or industrial segmentation theory. Kerr (1954), in a seminal paper, used the term Balkanization to describe American labor markets; whatever the label, the basic idea is that the labor market is divided into at least two submarkets. Mobility between the "segments" is restricted, opportunities for desirable work varies substantially between the segments, and returns to investment in education differ between the segments.

---

1. Other human capital variables include investment in physical health and migration, but these factors are not developed by formal schooling.

A large body of empirical research about the effects of schooling has accumulated. By far the most consistent finding in this literature is that the number of years of formal schooling affect such labor market outcomes as occupational status and income (Blau and Duncan 1967; Sewell and Hauser 1975, 1972; Jencks et al. 1972; Mincer 1974; Alexander, Eckland, and Griffin 1975; Otto and Haller 1979). The mechanisms by which schooling affects employment outcomes are subject to debate, however. The finding that schooling affects occupation or earnings is consistent with the interpretation that schooling directly affects productive skills, that schooling affects "habits of industry," and/or that schooling provides a certification function.

Formal schooling tends to show a much stronger impact on occupational status than on earnings, especially when the sample is restricted to a single cohort (Sewell and Hauser 1975). In age-heterogenous samples, with control for age, larger effects are observed (Mincer 1974). Stimulated by dual labor market theory and other "radical" viewpoints, such as Maxian theory, a growing empirical literature has consistently improved on the power to predict earnings by introducing measures of market segments, industrial segments, and job authority (Wright and Perrone 1977; Tolbert 1982; Kalleberg, Wallace, and Althauser 1981; Beck, Horan, and Tolbert 1978, 1980a, 1980b; see Hauser 1980 for a critique). On balance, this line of research certainly has not supplanted theory and research carried out within the neoclassical framework. It does, however, provide a stimulating complement to the traditional research paradigm.

The focus of the present paper is on labor market outcomes for youth who are employed part-time while attending high school. Existing theory and research on labor market outcomes apply primarily to adults. As is evident from the brief review of this work just given, it is not likely that a precise model can be derived connecting the experiences of youth in the part-time labor market to a well-defined set of independent variables. First, existing work does not supply a well-documented theory that applies to adults, and so generalization to youth appears unlikely. Second, such key variables as education and labor market segment do not apply to a cohort of individuals all in the same year in school and, generally, working in the same labor market segment. Utility theory of the labor-leisure choice, however, does offer some promise of applying to youth in the part-time labor market. Also, some elements of demand theory that parallel Thurow's view of the hiring process can be used to generate hypotheses regarding employment outcomes of youth. The next subsections of this paper sketch the rudiments of the labor-leisure and demand theories and apply them to the labor market experience of youth.

Labor Supply

General Theory

Economic theory of labor supply in its simplest form indicates that wage rate is the primary enticement to work; the higher the wage, ceteris paribus, the more hours a person is willing to work. In the rudimentary form of the

theory, it is assumed that there is no unearned income, that each individual controls his/her amount of time at work, and that there are no costs associated with entry into the labor market. People are presumed to value positively leisure time and monetary income. Since in this simplified scenario all income is earned, and there is a finite amount of time in any given period, individuals must strike a balance between time at work, which brings income, and leisure (i.e., time not at work), which is valued for its own sake. Each individual strikes the balance between earnings and leisure in such a way that overall satisfaction is as high as possible, given the constraints of the circumstances.

These basic ideas generally are presented as a formal model. The term utility is defined to mean overall satisfaction. Utility is represented as a function of leisure time and monetary income, and it is assumed that individuals maximize their own utility functions, subject to the constraint that there is a finite amount of time in any period to divide between leisure and earning income. In mathematical notation, each person faces the following optimizing problem:

$$\text{Maximize:} \qquad U = f(L,\$) \tag{1a}$$

$$\text{Subject to:} \qquad T = L + H \tag{1b}$$

$$\text{or} \qquad \$ = w(T-L) = w(H)$$

where

U = utility
f = the utility function
L = leisure time (hours)
H = hours of work time
T = total time (hours) in the period
$ = total monetary income
w = wage

To reflect economic theory, the utility function (f) must be such that an increase in leisure with earnings constant always increases utility, and an increase in earnings with leisure constant always increases utility. Although the first formulation of the constraint (T = L+H) offers a heuristic appeal because it shows explicitly how the time constraint operates, the second version [$ = w(T-L)] generally is preferred since it shows how the wage rate operates.

A graphic representation of the model is shown in figure 1. In the graph, the negatively sloping straight line MT represents the budget constraint, namely equation (1b). At zero hours of work, L = T and earnings are zero. When L = 0, earnings are maximum (M). The slope of MT equals the negative of the wage rate as indicated by the second expression of the budget constraint [$ = w(T-L)]. The curved lines on the graph, labeled U_1, U_2, and U_3, represent different levels of utility. Utility is constant along the entire length of each U_i--the farther from the origin, the higher the utility. These curves are termed indifference curves, since overall satisfaction is the same at all points along each curve. Thus, each individual allocates time between work and leisure with the goal of reaching the highest utility curve that is possible given the budget constraint.

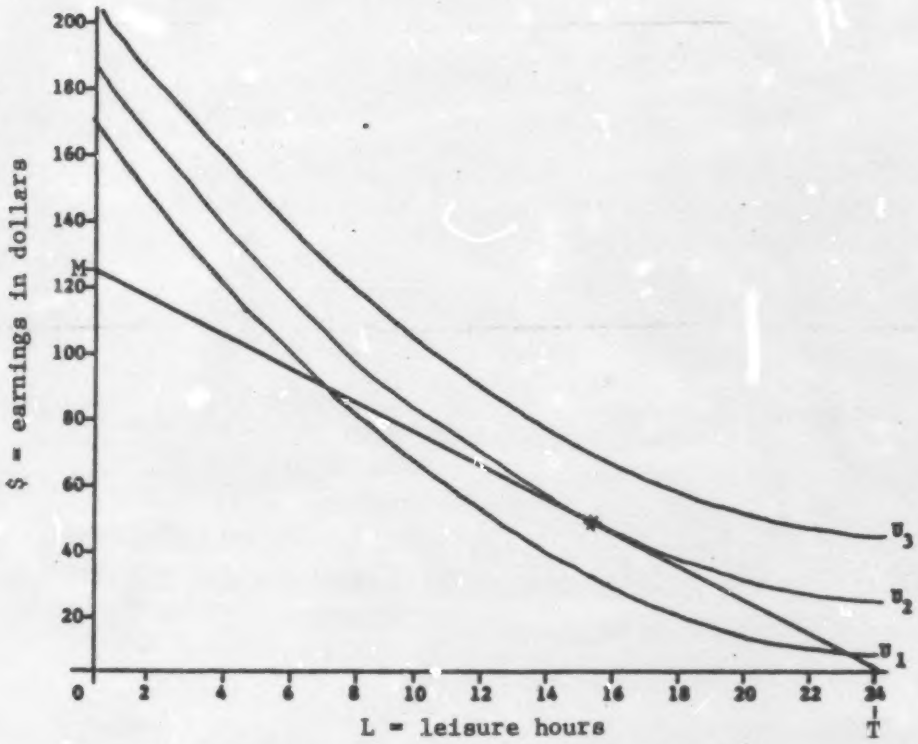

Figure 1. Graph of the labor-leisure choice: Simplest case

Application of mathematical analysis to solve the optimizing problem given in equation (1) yields the conclusion that utility is maximum when substitution of earnings for leisure equals the wage rate. This optimum occurs on the utility curve that is tangent to the budget line, as marked by an asterisk in figure 1.

Intuitively, this idea is easy to grasp. All utility curves that fall above the budget constraint (MT), though desirable relative to current circumstances, are impossible to achieve because of the budget (time) constraint. Any indifference curve below the tangency yields less overall satisfaction than could be achieved within the budget constraint; hence, individuals tend to move toward the tangency point.

Several criticisms might fairly be leveled against such a simplistic view of individuals' labor-leisure decisions. First, persons seldom have complete control over the number of hours they work in a day or week, and very often they do not control the number of weeks they work per year. Typically, an individual has partial control over the decision to work or not to work, and control over the amount of time spent at work, given that one is employed,

resides with the employer. In the long run, individuals may seek employment in which the number of hours per day/week approximates their personal preferences and thereby gain partial control over time spent at work. But it is unlikely that the distribution of hours per period that may be found in jobs matches the distribution of personal preferences closely enough to permit individuals to exercise a dominant influence over the time they spend at work. Of course, some jobs do permit individuals to adjust their work time, within specified limits. This feature probably characterizes part-time jobs that youth are likely to hold more frequently than it does all jobs. Hence, the theory may describe labor-leisure choices of teenagers more adequately than it does those of adults. On balance, however, it undoubtedly is true that control of youth over the number of hours they work per period is substantially less than required by the theory, strictly interpreted. Nevertheless, as a first approximation, the theory provides a useful framework.

The second and third objections to the model are closely related. Most individuals are not entirely dependent on their own earnings for cash income. Most people live in family units and depend in varying degrees on earned income of other family members. This circumstance especially characterizes teenage youth. Also, some households have unearned income that affects their need for earnings. These objections can be handled by introducing additional features into the model (see Keeley [1981] for a review). The more complicated model includes earnings of other family members and unearned income. Again, each person's problem is to maximize utility subject to a budget/time constraint, as represented in the following equations:

$$\text{Maximize:} \quad U = f(L_S, L_F, \$) \tag{2a}$$

$$\text{Subject to:} \quad \$ = w_S(T - L_S) + w_F(T^* - L_F) + Y \tag{2b}$$

$$L_S \leq T \tag{2c}$$

$$L_F \leq T^* \tag{2d}$$

where

- U = utility of the entire family
- f = the utility function
- L_S = leisure time for oneself
- L_F = leisure time for family members other than oneself
- w_S = wage for oneself
- w_F = wage for other family members
- Y = unearned income
- T = total time in the period
- T^* = nT, where n = the number of family members other than oneself who could work

For simplicity, other family members are grouped into one category, but the theory can easily be expanded to include each family member separately.

Unearned income Y and the earnings of other family members are similar in that they both provide disposable income to the individual that is not the result of the individual's own time at work. They differ in that unearned income is not affected by any family member's labor-leisure choices, whereas

the time at work each family member desires is affected by the time all other family members spend at work. By postulating that the utility of the family U is the sum of individual utilities, the standard analytic tools may be applied to equations (2), with results that closely parallel conclusions derived from equations (1).

A fourth objection to the model of labor supply is that it does not account for time and money costs of entry into the labor market. These costs can be incorporated into the model (Keeley 1981), however. Including entry costs leads to the conclusion that labor supply is discontinuous. If one works at all, it is necessary to work enough hours to cover entry costs. Thus, hours of work offered by any given individual may jump discontinuously from zero to some positive number. Accounting for entry costs can affect estimates of labor supply equations (Cogan 1976).

Finally, the simple model of equations (1) or (2)--cannot be used to derive implications that can be tested empirically. The functional form of the utility function is not specified, and there are only two independently varying variables in the model, as represented in equations (1)--wage and leisure time (or its complement, work time = T-L). In practice, the form of the utility function generally is left unspecified, and various ad hoc empirical equations are estimated to study the effect of wage on labor supply. Typically, a linear labor supply equation is specified, and numerous variables in addition to wage rate are included as "control" variables (Garfinkel 1973; Greenberg and Kosters 1973; Boskin 1973; Kalacheck and Raines 1970). In the following paragraphs, however, a specific utility function is specified such that a linear labor supply function is implied. While the utility function specification is partially arbitrary, the exercise provides a useful heuristic device.

Specific Model of Labor Supply

The intention of this section is to derive a usable labor supply model from a specific optimizing model of labor-leisure choice. Consider the following specification of the simple model, equations (1):

$$\text{Maximize:} \quad U = aL - 1/2L^2 + b\$ \tag{3a}$$

$$\text{Subject to:} \quad \$ = w(T-L) \tag{3b}$$

The solution to this problem generates a linear labor supply function, as follows:

$$H = T - L = (T-a) + bw \tag{4}$$

Since the theory of utility requires that U is a positive function of L and \$, it immediately follows that b is positive. Straightforward algebraic analysis also indicates that for utility to be a positive function of leisure over the range $0 \leq L \leq T$, a must be larger than T. Hence, one is led to expect a negative intercept (T-a) on the labor supply function (4).

Although equation (4) predicts that individual labor supply is a positive function of the wage rate, it is only a skeletal equation, because labor supply undoubtedly depends on numerous factors in addition to the market wage. A simple way to introduce additional independent variables into the model is to assume that part of the utility derived from time at work is due to nonmonetary satisfactions and self-improvement (human capital formation) of job experience. Suppose that H = T - L represents hours on the job and examine the term b$ in the utility function (3a).

$$b\$ = bw(T-L) = bwH$$

Thus, one sees that the sole satisfaction of work hours H is derived from earnings. Suppose, however, that nonmonetary satisfactions also are derived from work and let us represent those by x. A revision of the model incorporating the concept of nonmonetary pleasures of work is given in the following representation:

$$\text{Maximize:} \quad U = aL - 1/2L^2 + (b_1w+b_2x)H \tag{5a}$$

$$\text{Subject to:} \quad T = H + L \tag{5b}$$

where the constraint is written in terms of time rather than dollars, because the emphasis on the earnings component has been relaxed. (All terms in [5] have been defined previously.) The solution to the optimizing problem in (5) yields the following results:

$$H = (T-a) + b_1w + b_2x \tag{6a}$$

$$b_1, b_2 > 0 \tag{6b}$$

$$a > T \tag{6c}$$

Thus, a linear labor supply equation (6a) is implied by the extension of the theory represented in (5). Conclusions regarding the signs of the coefficients that were derived from the simpler version (3) carry over to the current version. The coefficients on wage and the other independent variable (nonmonetary satisfactions of work) are predicted to be positive.[2] The intercept T-a must still be negative if utility is a positive function of leisure and of monetary and nonmonetary benefits of work (relation [6c]).

In the present case, however, the expectation of a negative intercept is not a bona fide empirical prediction of the theory, because the intercept can be adjusted arbitrarily by changing the origin on the x variables. This is not a problem when wage is the only return to work time since wage has a natural origin at zero, but any empirical measures of x undoubtedly will not have a natural origin. This being the case, two strategies for interpretation are feasible. First, one may adjust the origin of x variables to assure a positive partial effect of change in leisure on utility--

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2. Any negative valuation on time at work can be represented by incrementing the coefficient on L in (5a)--a.

$$\frac{\partial u}{\partial L} = a - L$$

$$\frac{\partial u}{\partial L} \min = a - T$$

The resulting adjustment may then be used in the interpretation of the relative returns of wage and nonwage aspects of work to time spent at work. The alternative is to adjust the x variables to zero origin and apply a standardization constant to match their variances with the variance of wage. If the effect of leisure on utility then turns out to be negative over part of the range of x and w, then one may surmise that too much leisure is devalued--after leisure time exceeds a, any more leisure detracts from overall satisfaction.

Of course, extension of the model to include more than one type of nonmonetary benefit of work is obvious. Degree of adherence to the work ethic certainly is one of the variables that should affect nonmonetary benefits of work. Since attitudes toward work vary by such variables as gender, parental socioeconomic status, and race, these variables also are candidates for inclusion as x variables. Since many of the variables that affect supply of labor also may affect demand, however, complications arise over interpretation of empirical estimates of effects. These complications will be addressed in a later section.

Among youth who remain in school, schooling is so time-consuming, and time spent on schooling is so qualitatively different from other nonwork time, that it is artificial to group all nonwork time into a single category. Any realistic model of labor supply for in-school youth, therefore, must account for time spent on schooling and the value each individual places on education. Schooling activities and work cannot be carried out at the same time; therefore, one is led to expect a negative relationship between valuation of education and time spent at work, after controlling for the benefits of work.[3]

For statistical analysis, it is convenient to have an empirical relation in which benefits of work and indicators of valuation on education enter linearly in the labor supply equation. There is more than one specification of the utility model that will generate the desired linear function. A relatively complete, yet parsimonious, specification is shown in the following model:

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3. Such activities as experienced-based career education might be viewed as both schooling and work. In this paper, however, it is assumed that schooling and work are mutually exclusive. This is not a serious limitation, since it is always possible to construct operational criteria to classify all activities into a work or schooling category. A more refined version of the theory could be developed to include education-sponsored work experience as a separate category.

Maximize: $U + aL - \frac{1}{2}L^2 + (b_1w+b_2x)H - \frac{1}{2}H^2 + czS - \frac{1}{2}S^2$ (7a)

Subject to: $T = L + H + S$ (7b)

where

U = utility
L = leisure time
H = hours on the job
S = hours spent on schooling
T = total time in the period
a, b_i, c = empirical constants, all positive
w, x = wage and nonwage benefits of work, respectively
z = valuation placed on schooling

This formulation implies the following labor supply model:

$$H = \frac{1}{3}(T-a) + \frac{2}{3}b_1w + \frac{2}{3}b_2x - \frac{1}{3}cz \quad (8a)$$

which is a linear specification of the following general form:

$$H = a^* + b^*_1w + b^*_2x - c^*z \quad (8b)$$

with

$$a^* = \frac{1}{3}(T-1)$$

$$b^*_1 = \frac{2}{3}b_1$$

$$b^*_2 = \frac{2}{3}b_2$$

$$c^* = \frac{1}{3}c$$

The utility model leads to an intuitively pleasing result. Time offered for work depends positively on rewards of work, wage, and nonwage (w, x)--and negatively on valuation or benefits of schooling (z). It should be noted that valuation of schooling contains two important components--direct utility from time spent at school and future discounted earnings due to the impact of education on future earnings.

Following the same reasoning as previously, if leisure is positively valued over its entire domain, the intercept will be negative--

$$a^* = \frac{1}{3}(T-a) < 0 \quad (9)$$

However, as argued earlier, in the absence of scales for x and z with natural origins, this result is not a bona fide prediction, since the intercept can be adjusted arbitrarily by translating the scales of x and z.

Demand for Labor

The theory of labor-leisure is a theory of the supply of labor. This subsection of the paper reviews the manner in which supply and demand operate together to produce the number of people who work or the number of hours worked. The demand side of the equation then is used to develop hypotheses about the influence of school characteristics on employer demand for services of youth who attend schools with particular characteristics.

Supply and Demand

In a competitive labor market with full information, the number of people working is determined jointly by the supply function and the demand function. According to mainstream economic theory, aggregate supply of labor covaries positively with the wage rate, and aggregate demand covaries negatively with wage. Consequently, the two curves must intersect; the number who are working coincides with this intersection, as depicted in figure 2.[4]

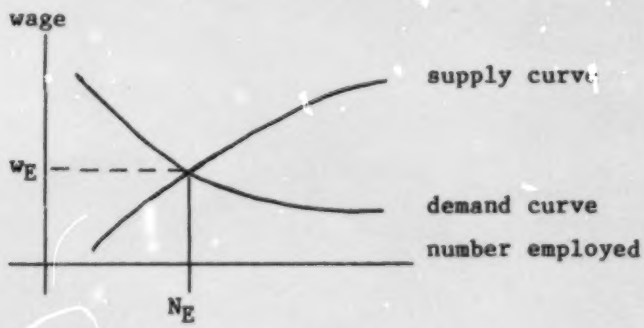

Figure 2. Supply and demand determination of the number of unemployed persons

As shown in figure 2, the equilibrium wage rate is w_E, and the equilibrium number of employed persons is N_E.

If the current wage is above equilibrium, unemployment will result. This contention is represented graphically in figure 3. In a perfectly competitive market, the current wage will shift quickly to the equilibrium wage, thus eliminating unemployment. If nonmarket barriers to shifts in the wage rate are imposed, however, unemployment will persist. Factors that typically might hold the current wage above the market wage include collective bargaining, legislatively imposed minimum wage, and retarded flow of information about job vacancies to prospective employees.

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4. Even though wage is the "independent variable" by convention, it is displayed on the y axis.

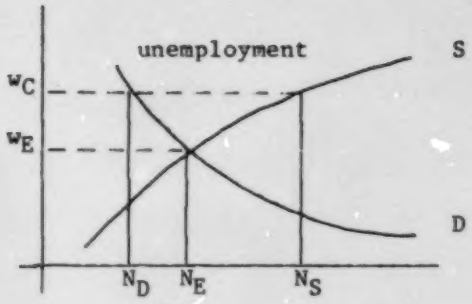

Figure 3. Effect of minimum wage on unemployment

NOTES:
- w_C = current wage
- w_E = equilibrium wage
- N_D = number of employees demanded by employers at the current wage
- N_E = number of employees demanded at equilibrium
- N_S = number of persons willing to work at the current wage (supply)
- $N_S - N_D$ = unemployment

By imposing a slight modification on the aggregate theory of unemployment, it can be made to correspond more precisely with the individual-level theory of labor supply reviewed in the previous section. If the horizontal axes in figures 2 and 3 are designated as person-hours at work rather than number of persons working, then, with appropriate assumptions about interpersonal independence of utility functions, the supply curve becomes a straightforward aggregation of the individual theory of labor supply equation (4). The aggregate theory then becomes a theory of underemployment, with umemployment a special case in which persons who want to work, work zero hours.[5]

Demand-Side Hypotheses

The aggregate theory of supply and demand, reviewed in the preceding subsection, rests in part on the assumption that aggregate demand for labor is negatively related to the wage rate. Thus, a primary hypothesis from the demand-side theory is that hours of work are negatively related to wage. In formulating this hypothesis, the aggregate theory is applied to individuals. The assumption here is that the aggregate negative relationship between wage and demand for labor results at least in part from adding up negative effects at the individual level.

In the simplified theory of labor supply presented in this paper, it was concluded that labor supply is positively related to wage. This conclusion

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5. In this context, underemployment refers to one who works fewer hours than desired and not to persons who work below their skill level.

contrasts to the negative relationship between demand for labor and wage. Since actual hours worked depend both on supply and demand considerations, one is left with ambiguity about the direction of the empirical relationship between wage and hours worked. This ambiguity raises important issues regarding appropriate methods of data analysis. These issues will be discussed in detail in the next section of this paper.

The demand theory indicating that the number of hours of work desired by employers depends primarily on wage is based on assumptions of a competitive market. In a competitive market, wage and hours are jointly determined by the impersonal interplay of market forces. Neither employers nor employees have any significant impact on the "price" of labor (wage). In fact, however, large firms almost certainly have at least partial control over the wages they pay, and labor exercises substantial influence on wages via collective bargaining. Since teenage youth seldom belong to labor unions, the wage they receive is a given; their only control is to shop for jobs among different firms. Firms that employ teenagers are constrained in their wage policies by the minimum wage law but probably not by competitive shopping of youth, since the unemployment rate among youth is so high.

Lester Thurow's (1975) theory of labor queues provides some insight into factors other than wage that may affect employer demand for teenage workers. He argues that productivity, and therefore wage, resides mostly in the job rather than in the individual. Work organization and physical capital are the primary determinants of output, because most normal individuals are capable of carrying out the routine tasks required in most jobs. Nevertheless, most jobs do require some training time. Since training is a cost to employers, they are motivated to select employees who learn rapidly.

When unemployment is low, of course, employers are unable to select employees; but when unemployment is high, as in the youth labor market, employers are able to select employees who are likely to minimize training costs. Intelligent selection depends on having information about factors that are indicative of training costs. Since information is expensive, however, the tendency is to rely on a few rough indicators, especially when the variance in training cost is not high.

Training costs undoubtedly are not the only factors that affect employers' selection of employees and the hours and wages that will be offered to employees. In the relatively low-skill jobs that generally characterize the youth labor market, job performance depends heavily on a responsible attitude. Good employees must show up on time and stick to a task while at work. The factors that are indicative of training costs also are likely to indicate "habits of industry," however, so it is not essential to differentiate between training costs and aspects of job performance.

Collectively, the several indicators of training costs and job performance may be thought of as profiles describing individual youth. Youth with desirable profiles will be in higher demand than their peers. Thus, they are likely to find jobs more readily if they decide they want to work, and they are likely to work more hours and be paid a higher wage.

For the present study, at least three principles help to identify components of the profiles that employers are likely to use in determining demand for teenage workers. First, each component must vary among high school seniors. Since this study was conducted on a sample of seniors, lack of variation among seniors eliminates variables, such as years of schooling and age, that are important in adult populations. Second, components of the profile must be relatively easy (inexpensive) for employers to observe. Finally, each component must be a factor that employers are likely to believe differentiates among youth in ways that affect training costs and job performance. Two primary classes of variables appear to meet these criteria. Since identification of the high school a youth attends is relatively cheap and schooling is widely regarded as pertinent to work, it is a good hypothesis that (perceived) quality of the high school is an important class of variable that affects employer demand for youth. This hypothesis is reinforced by the fact that criteria, such as years of schooling, that apply to adults cannot be used with a single cohort of youth. A second category of variable that is likely to affect employer demand for teenage employees is personal characteristics, such as race, ethnicity, gender, and socioeconomic background.

The types of high school characteristics that employers may use to assess the overall desirability of students attending those schools include the quality of instruction, quality of facilities, disciplinary atmosphere at the school, socioeconomic context, and demographic composition. In this study, school means of student responses and items on the administrator's questionnaire are used to develop several indexes of these school characteristics. A detailed accounting of the measures is given in the "Methods" section of this paper.

So far, attention has been focused on factors that particular employers may use to differentiate among job applicants and current employees. In a national sample there is an additional consideration that probably affects the demand for work faced by different members of the sample, namely, characteristics of the local economy, such as growth rate and unemployment rate in the youth labor market. Although the importance of local labor market conditions is recognized, it is not feasible in this study to examine effects of variables describing local markets because the needed data are not available. In the absence of descriptive data on local labor markets, regional dummy variables are used as proxies in an effort to control, at least partially, for local conditions.

Wage is not the only variable that may have an effect on both supply and demand for labor. Certainly, personal characteristics may be pertinent to supply as well as to demand. Effects of the personal variables on supply probably operate through a collection of attitudes, but in the absence of a complete set of attitudinal variables, the personal characteristics may enter the supply side as well as the demand side of the equation. It is also possible that school characteristics affect supply indirectly by influencing individuals' valuation of schooling. Youth attending relatively "high-quality" schools are likely to value schooling more than similar youth attending other schools. Finally, one cannot entirely rule out variation of supply by geographic region, so that region also may enter the supply equation.

As discussed in detail in the "Methods" section of this paper, efforts to separate supply and demand effects require assumptions about which variables appear in the supply equation and which appear in the demand equation. In this paper, personal characteristics are entered in both, initially the school characteristics are entered only in the demand equation, and the regional dummy variables are entered only in the demand equation.

METHODS

Data

The data for this study consist of some 28,000 seniors in the High School and Beyond (HSB) survey. The data set contains several key variables pertaining to part-time work during school, including employment status, hours worked during the week prior to the survey, whether each respondent was looking for work, and wage of the current or most recent job. Wage is measured from a separate question in which respondents checked categories containing wage ranges. This method of measurement avoids the difficulties encountered when wage is measured by dividing total earnings by hours. The fact that wage is for the current or most recent job avoids the problems that arise in defining a wage for persons who are not currently working. In the present data, there is not a built-in correlation between hours and wage because both are defined to be zero when one is not working. Also, since a large majority of the sample has worked at some time, selection bias that might occur because of missing wage information is not a serious problem. The HSB data also contain a wealth of information describing socioeconomic characteristics of respondents' families, scholastic test scores, school-related behaviors, and attitudes about school and work. The data were collected in the spring of 1980 by the National Opinion Research Corporation under a contract from the National Center for Education Statistics (NCES). Although a follow-up survey currently is in progress that will make the data set longitudinal, data available for the present paper are cross-sectional. More detail on the sample and data collection can be found in NORC (1980) and NCES (1982).

Variables

The primary dependent variables in this study are hours of work time, wage, unemployment, and labor force status (in/out of the labor force). The HSB data contain relatively direct measures of each of these variables. Wage and hours are defined in the obvious way, with category codes in the raw HSB data transformed to the midpoint of the range covered by each category. Unemployment is defined as 1 if the youth looked for work in the last week but was not working, 0 if s/he was working, and missing if the youth was neither working nor looked for work. This definition corresponds closely to the definition used in compiling government statistics. Labor force status is defined as 1 if the youth was working or looked for work in the last week, and 0 otherwise, again in conformity with the definition used in government statistics.

Two primary categories of variables other than wage are identified in the discussion of labor supply as affecting hours of work that youth find optimum--nonpecuniary rewards of work and valuation of schooling. The chief categories of variables other than wage that are identified as affecting demand are personal characteristics and school characteristics indicative of school quality. Additionally, personal characteristics and socioeconomic background are noted as potential factors affecting supply.

The HSB data do not contain custom-tailored measures of the variables identified in the theoretical framework; hence, in many cases reliance on proxies is necessary. Table 1 lists all the variables used in the analysis, describes their operational definitions, and reports means and standard deviations. The variables are arranged in categories so that the empirical variables used as proxies for particular concepts are identified. Not all the variables used in the analyses are closely tied to the theoretical framework; some are included as "control" variables because experience suggests the need to include them in a variety of contexts. Others are included because of their relevance to policy. These types of variables are identified in table 1 by categorical headings. Finally, where theory indicates the expected direction of effect on supply and demand, the table records the expectation in the last two columns.

In several instances, the relationship between the proxy measure and the concept it is intended to reflect is rough, particularly in the case of nonpecuniary rewards of work and valuation of schooling. Use of the index of work values as a proxy for nonpecuniary compensation for work is justified on the grounds that those who value work highly are more likely to find satisfaction in holding a job, in performing job duties well, and in the income associated with work. The school rating index is composed of items requesting respondents to rate selected aspects of their school, such as instructional quality and reputation in the community. The index is used as a proxy for valuation of schooling on grounds that those who rate their school high are more likely to feel they derive benefit from schooling. Interest in school is used because youth who are interested in school are likely to believe they derive more benefit from schooling. Likewise, those who expect to attend college probably view their high school education as more important than those who do not expect to attend college. Finally, the deportment index is composed of six items, all but one of which measure behavior at school, for example, tardiness and skipping classes. The remaining item refers to being in trouble with the law. It is assumed that "good" deportment reflects a belief that school is worthwhile. All the items have been scaled so that high values reflect high valuation of schooling. For example, the original item on school attendance asked for days absent (without being sick). The item was reflected to indicate days present, assuming 180 days in the school year.

There are four primary school variables that index characteristics that are likely to be pertinent to employers' assessments of school quality: (1) mean of school rating index, (2) mean of deportment index, (3) mean of school quality ratings--sophomore index, and (4) school quality index constructed from the administrator's questionnaire. The first of these, the school average of the school rating index, contains items such as student

TABLE 1

LIST OF VARIABLES

	Mean	Std. Dev.	Effect on Supply	Effect on Demand
Primary Dependent Variables--Work Experience				
1. HRSLSWK--hours worked last week, coded into categories ranging from 0 hours to 40 hours	10.1	12.2		
2. WAGE--hourly wage rate of the current or most recent job, coded into categories ranging from $1.00 to $5.00	3.23	.889	+	-
3. INLF--labor-force status, 1 = in the labor force, 0 = not in the labor force	.749	.433		
4. UNEMPL--employment status, 1 = unemployed, 0 = employed (missing if INLF=0)	.178	.382		
Primary Independent (Jointly Dependent) Variables Associated with Supply Theory				
Nonpecuniary rewards of work:				
5. WORKVAL--index of work values, an average of standardized scores on three items indicating (a) the importance of work, (b) the importance of steady employment, and (c) the importance of earning money to the respondent. The index was created by NORC	.00644	.697	+	
Valuation of schooling:				
6. SCHRAT--school rating index, average of six items that asked respondents to rate (a) the condition of the school building, (b) the quality of the school library, (c) the quality of instruction, (d) effectiveness of discipline, (e) fairness of discipline, and (f) reputation of the school in the community	2.611	.591	-	
7. INTSCH--interest of the respondent in school, 1 = interested in school, 0 = not interested	.759	.428	-	
8. COLLEXIO--college expectation in grade 10, a retrospective measure asked of seniors, 1 = expected to go to college, 0 = did not expect to go to college	.584	.493	-	
9. DPORTMNT--index of deportment at school and in the community, average of six standardized items that asked respondents (a) how frequently they were absent from school but not sick, (b) how frequently they were tardy, (c) whether they had discipline problems at school, (d) whether they had been suspended from school, (e) whether they cut classes, and (f) whether they had been in trouble with the law	-.0294	3.56	-	

TABLE 1 (continued)
LIST OF VARIABLES

	Mean	Std. Dev.	Effect on Supply	Effect on Demand
Primary Independent Variables Associated with Demand Theory				
School characteristics--school means:				
10. MSCHRAT--mean of school rating index, average calculated within schools of SCHRAT--the average including both seniors and sophomores	2.62	.290		+
11. MDPRTMNT--mean of index of deportment, average calculated within school of DPORTMNT--the average including both seniors and sophomores	0	3.84		+
12. SPHSCHOL--mean of six items appearing only on the sophomore questionnaire, the items being ratings of problems in the school relating to (a) attendance, (b) cutting classes, (c) talking back to teachers, (d) following teacher instructions, (e) student fighting, and (f) student attacks on teachers	1.95	.236		+
School characteristics--not school means:				
13. ADMSCHOL--school quality index constructed from administrator's questionnaire, mean of twelve items asking about the following problems in the school: (a) student absenteeism, (b) students cutting classes, (c) lack of parent interest in student progress, (d) lack of parent interest in school matters generally, (e) physical conflicts among students, (f) conflicts between students and teachers, (g) theft, (h) vandalism, (i) student use of drugs or alcohol, (j) rape, (k) student possession of weapons, (l) student verbal abuse of teachers	2.88	.366		+
Personal characteristics:				
14. RACE--race of the youth, 1 = black, 0 = other	.143	.350		-
15. HISPANIC--ethnicity of the youth, 1 = Hispanic, 0 = other	.202	.401		-
16. GENDER--gender of the youth, 1 = female, 0 = male	.522	.500		
Secondary Independent Variables Associated with Demand Theory				
School characteristics--not school means:				
17. LPPEXP--logarithm of per pupil expenditure	7.01	.814		+
18. HISPENRL--Hispanic enrollment percentage	10.6	20.9		-
19. BLCKENRL--black enrollment percentage	14.6	23.3		-
School context--school means:				
20. MFOCCSES--school mean of father's occupational SES	8.32	1.89		+

TABLE 1 (continued)
LIST OF VARIABLES

	Mean	Std. Dev.	Effect on Supply	Effect on Demand
21. MMOCCSES--school mean of mother's occupational SES	8.28	1.27		+
22. MFAMINC--school mean of family income ($1000)	21.2	5.15		+
Regional dummy variables:				
23. NEWENGL--New England, 1 = resides in New England region, 0 = elsewhere	.0488	.215		
24. MIDATL--Middle Atlantic, 1 = resides in Middle Atlantic region, 0 = elsewhere	.153	.340		
25. SOATL--South Atlantic, 1 = resides in South Atlantic region, 0 = elsewhere	.159	.366		
26. ESCNTRL--East-South Central, 1 = resides in East-South Central region, 0 = elsewhere	.056	.230		
27. WSCNTRL--West-South Central, 1 = resides in West-South Central region, 0 = elsewhere	.115	.318		
28. WNCNTRL--West-North Central, 1 = resides in West-North Central region, 0 = elsewhere	.0825	.275		
29. MOUNTN--Mountain, 1 = resides in Mountain region, 0 = elsewhere	.0527	.223		
30. PACIFIC--Pacific, 1 = resides in Pacific region, 0 = elsewhere	.129	.336		
"Control" Variables				
Socioeconomic background:				
31. FOCCSES--father's occupational status, status index constructed as reflected rank order of occupational category. The rank order was determined by the average education and income of the sample for each occupational category	8.55	3.93		
32. MOCCSES--mother's occupational status, status index being the same as that used for the father	8.33	3.62		
33. FATHED--father's education, approximate number of years of schooling completed	13.1	2.41		
34. MOTHED--mother's education, approximate number of years of schooling completed	12.6	1.97		
35. LFAMINC--log of family income ($1000)	2.89	.547		
36. NSIB--estimate of number of siblings	3.07	2.08		
37. BORNUS--Born in the U.S., 1 = yes, 0 = no	.941	.235		

TABLE 1 (continued)
LIST OF VARIABLES

	Mean	Std. Dev.	Effect on Supply	Effect on Demand
38. MOWORK--mother's work history, sum of three items indicating whether mother worked (a) before the youth was in school, (b) while the youth was in grade school, and (c) while the youth was in high school	1.98	.727		
39. LOWNCHLD--live in the same household with own child, 1 = the youth has a child that lives in the household, 0 = other	.0143	.119		
School enrollment:				
40. LHSSIZE--log of high school enrollment size	6.88	.766		
Work Experience				
Lagged hours of work time:				
41. HRSLSUM--average hours per week worked last summer	23.4	15.7	+	+
42. HRSLSCH--average hours per week worked last school year	13.1	12.9	+	+
Test Scores				
43. VOCBTST--vocabulary test score, mean of standardized scores ($\bar{x}$ = 50, SD = 10) on eight vocabulary test items	51.2	9.55		
44. READTST--reading test score, mean of standardized score ($\bar{x}$ = 50, SD = 10) on eight reading test items	51.2	9.60		
45. MATHTST--math test score, mean of standardized score ($\bar{x}$ = 50, SD = 10) on eighteen items	50.6	9.59		
Policy-Relevant Variables				
46. PVTSCH--school is privately owned, 1 = yes, 0 = no	.126	.328		
47. VOCSCH--school is a vocational high school, 1 = yes, 0 = no	.0180	.131		
48. MINCOMP--school requires minimum competency tests	1.78	.690		
49. CETA--school participates in CETA, 1 = yes, 0 = no	.743	.428		
50. COOP--school participates in co-op education, 1 = yes, 0 = no	.620	.472		
51. WRKSTUDY--school participates in work study, 1 = yes, 0 = no	.629	.471		
52. DESEG--school is under court order to desegregate, 1 = yes, 0 = no	.219	.406		

ratings of instructional quality and library quality. The mean of deportment index also is a school average of the individual-level variable identified as DPORTMNT. As noted already, it contains mostly student reports of their behavior in school. The sophomore index is composed of items that appear only on the sophomore questionnaire. It contains student ratings relating to problems in the school, such as students' talking back to teachers. All of the other school-mean variables were calculated from both sophomores and seniors. The school quality index constructed from the administrator's questionnaire contains twelve items that query respondents about school problems, such as teacher absenteeism and unruly students. It should be emphasized that all of these "school quality" variables have been scaled so that desirable school characteristics are represented by high scores.

Five variables classified under secondary independent variables associated with demand theory are demographic characteristics of the student population (or HSB sample in the school). These include percentage of Hispanic and black enrollment parental occupation, and family income. These variables are included on the assumption that employers may use such characteristics informally (or even subconsciously) to rate school quality.

The eight regional dummy variables are included as proxies for characteristics of local labor markets, in the absence of descriptive data on each community. The regional variables, admittedly, give only a rough approximation. There may also be important variations in supply-side variables by region, so that they cannot be viewed as pure indicators of variation in demand across regions.

Analysis

The preceding theoretical discussion indicates that wage has a positive effect on the number of youth that want to work, a positive effect on the number of hours each youth is willing to work per week, and a negative effect on the number of youth employers are willing to hire. It also is observed that several other variables may enter into both the supply and demand side of the equation. The possibility that several variables in the analyses affect both supply and demand raises knotty methodological issues resolution of which lies outside the scope of this report. In order to proceed, however, some assumptions must be imposed.

In the present paper, the hours equation is treated as primarily a supply equation, and the wage equation is interpreted as primarily a demand equation. These interpretations rest on the following reasoning: In the real-world labor market faced by youth, wages are attached to jobs rather than individuals; hence, the individual preferences about the hours to work has a minimal effect on wage. Employers select youth for jobs with attached wages according to employer judgments of the training cost and likely productivity of applicants. Applicants with relatively desirable profiles, as discussed above in conjunction with demand theory, will be hired in relatively high wage jobs. The hours demanded of employees depend, therefore, on exogenous factors primarily related to consumer demand for goods and services produced by the

firm. Since youth typically work in part-time jobs with varying number of hours worked per week, they have opportunity to influence the number of hours they work. Work in fast food services, for example, typically is characterized by a work schedule for each employee that varies from week to week. Hours not worked by one employee can be made up by another employee. Since managers tend to be indifferent between essentially equivalent workers, they do not mind accommodating desires of the employees.

This line of reasoning applies only to individual level behavior. It does not contradict the view that hours and wage are jointly determined in the aggregate by an interplay of supply and demand variables. Individuals working in a given firm could be given some latitude to adjust hours according to their tastes and face a relatively fixed wage in the short run. This does not preclude the firm from adjusting total hours of all employees according to the wage, nor does it preclude firms from making wage adjustments from time to time that respond to aggregate labor supply.

A second strategy for separating supply and demand effects also is followed in this paper. An equation for labor force participation is estimated as a supply equation. An equation for unemployment is interpreted as a demand equation. In these interpretations, it is assumed that labor force participation is an individual decision. Exit and entry decisions reside with individuals; hence, they are governed by supply variables. Unemployment, on the other hand, is a signal that one wants to work but can't find employment. Inability to find a job is due to lack of demand for one's services. The arbitrary definitions of unemployment and labor force participation render these interpretations somewhat questionable. Many individuals may not look for work, and therefore, be defined as not in the labor force, because they judge the chance of finding employment too low to justify the expense and time of looking. At least some of these individuals should be classified as unemployed instead of out of the labor market. Nevertheless, interpretation of a labor force participation equation as a supply equation and an unemployment equation as a demand equation is a reasonable first approximation.

In carrying out the analysis, it is assumed that wage rate affects hours of labor supplied. Hence, wage appears on the right in equations for hours and labor-force participation. It is possible, however, that the hours one is willing to work affect the wage an employer is willing to pay. Generally, modest efficiencies occur when an employee works long hours. Start up time required when one employee takes over the job from another is reduced, and paperwork required to establish job schedules, keep track of hours worked, and issue paychecks tends to be simplified when fewer workers work longer hours. Also, fewer employees need to be hired, so hiring and training costs are reduced. Hence, there may be a small positive demand effect of hours on wage. If so, then ordinary least squares regression is inappropriate for estimating coefficients in either the hours or the wage equation. The situation is complicated further by the fact that the proxy variables used to indicate nonpecuniary compensation for work and valuation of schooling also may be endogenous with wage and hours, and with each other.

A reasonable case can be made, however, that wage at the individual level is exogenous to hours supplied. Further, the proxies for nonpecuniary

compensation for work and valuation of schooling are attitudes that tend to form over relatively extended time periods and are relatively stable. Consequently, they may be exogenous to both hours and wage. Since the exogenous or endogenous character of these variables is in doubt, two estimation strategies are followed. First OLS is applied to an hours equation containing wage and the proxy variables for nonpecuniary compensation for work and valuation of schooling on the right. This is interpreted as a supply equation, so the variables identified primarily with demand (school characteristics) are omitted. A wage equation is estimated with OLS which omits hours and the variables indentified as primarily supply variables. The wage equation is interpreted as a demand equation. Ordinary least squares estimates of equations for labor force participation and unemployment also are presented. Second, two stage least squares estimates are examined with specifications paralleling those for OLS, except that hours and work values appear on the right in the wage equation. Hours, wage, and all the proxies for nonpecuniary compensation of work and school valuation are treated as endogenous.

Contextual Analysis

Several of the variables used in this study are created by calculating averages within schools of individual variables reported on the student questionnaires. Thus, the formal structure of some of the models corresponds closely to what is sometimes called a "contextual analysis." There is a long tradition in sociology of contextual analysis, running back as far as Durkheim. The first prominent contemporary example is an analysis of factors affecting satisfaction with military promotion policies among soldiers (Merton and Kitt 1950). A lively debate over contextual effects of schools on career aspirations and related variables has appeared in the sociology literature (Sewell and Armer 1966; Boyle 1966; Turner 1966; Michael 1966).

Robert Hauser, without doubt, is the strongest critic of contextual analysis (Hauser 1970, 1971, 1974; Hauser, Sewell, and Alwin 1976). Hauser (1970), argues forcefully that contextual analysis of the type to be reported here is "worthless" for imputing contextual effects. Hauser links his arguments against contextual analysis to Robinson's case against inferring individual-level correlations from "ecological" (group) correlations (Hauser 1971, 1974). The arguments he raises against contextual analysis, however, are not parallel to Robinson's technical proof that individual and group-level correlations are not equal. In a reaction to a methodological discussion published by George Farkas (1974), Hauser (1974) gives a thorough review of his objections, which are summarized as follows:

- The size of the contextual effects reported by Farkas are too small to be of substantive importance.
- Contextual analyses are subject to the criticism that important individual-level variables have been omitted from the specification of the model.
- Measurement errors in contextual analysis bias estimates of coefficients in predictable ways.

- Members of a population may select themselves into particular groups according to their levels on the dependent variable.

- Valid interpretation of contextual effects is difficult or impossible.

As can be seen from this list, Hauser's objections to contextual analysis are threats to validity that could be leveled against any form of analysis, contextual or otherwise. They stand in sharp contrast to Robinson's technical proof that ecological and individual correlations are not the same.

What Hauser seems to be objecting to most is the interpretation of effects associated with group means as having some mystical quality associated with emergent effects of "structure" that cannot be explained by personal characteristics of group members. He strongly objects to the imputed tendency of some sociologists to identify the unique contribution of sociology with such emergent effects of the group or of structure. Hauser writes,

> Clearly, levels of aggregation are not a fruitful basis for distinguishing social from psychological explanations. The distinction is better made in terms of the mechanisms by which variables are presumed to influence one another. The reality of the individual or the group need not be at issue in sociological explanation. (1971, p. 14)

In this paper there is no intention of inferring emergent sociological properties from contextual analysis. Initially, the school means are viewed as proxies for employer demand for services of youth who attend a given school. The question is: Do youth who attend schools with preferred characteristics earn higher wages than youth who attend schools with less preferred characteristics? Farkas (1974) gives a formal rationale for such interpretation. Following Farkas, let y be an employment outcome such as hours, x be an individual level variable such as personal deportment at school, and z be the school mean of x. A linear specification of the effect of x and z on y is

$$y = a + bx + cz$$

from which it follows that the effect of the school mean of deportment is

$$\frac{\partial y}{\partial z} = c$$

If x is omitted from the specification, then total effects of z are estimated. We are acutely aware of the many threats to the validity of such an interpretation and, therefore, clearly label the analysis as exploratory. We do not agree, however, that it is fruitless to conduct analyses in which group means appear as regressors. But we do agree with Hauser that effects associated with group means should not be interpreted as emergent effects of "structure" that could not, in principle, be explained by the operation of variables measured on individuals (see Boyd and Iversen [1979] for a review of contextual analysis and methodology).

RESULTS

Results of the statistical calculations are presented in three subsections. The first subsection contains OLS estimates of supply and demand equations. Equations for hours worked last week and labor force participation are interpreted as supply equations. Equations for wage and unemployment are taken as demand equations. The second subsection examines 2SLS estimates of supply and demand effects using similar specifications to those used in the OLS estimation. Attention here is confined to an hours and a wage equation, however. The final subsection presents estimates of effects of variables that are pertinent in policy discussions.

OLS Estimates of Supply and Demand Effects

Table 2 contains the OLS estimates of supply effects. The table reports estimates only for the independent variables of primary interst. The complete specification of the two equations is given in the notes to the table. The results are indeed encouraging. All of the proxy variables used to indicate the concepts associated with the utility model of labor supply exhibit the predicted sign in both the hours equation and the labor force participation equation. Most of the coefficients are highly significant statistically. Only one, school quality rating in the labor force participation equation, is not statistically significant.

The magnitude of effects are difficult to compare across independent variables with different measurement scales. Consequently, coefficients standardized to the wage scale are reported in parentheses (calculated as if each independent variable had the same standard deviation as wage). Comparison of the standardized coefficients shows that wage has by far the largest effect on labor supply. Each dollar increase in wage is associated with an average increment of just over two hours per week of work. The next largest effect on hours is associated with interest in school (a single item). Those expressing interest in school average about one hour less work time per week than those who say they are not interested in school. Those who said they had expected to attend college when they were in the tenth grade work about two-thirds of an hour less per week. Since the other variables primarily associated with supply theory are measured on entirely arbitrary scales, parallel interpretations of their effects are not so meaningful. It is clear, however, that adherence to the work ethic tends to increase hours at work, and valuation of schooling as indexed by deportment and the school rating index tend to reduce supplied hours of work.

Similar interpretations apply to the labor force participation equation. The largest effect is on wage. Each extra dollar per hour increases the chance of being in the labor force by about 7 percent. Those who express interest in school and those who say they expected to attend college when they were sophomores are about 2 percent less likely to be in the labor force. Adherence to the work ethic increases the likelihood of being in the labor force, while deportment and school rating decrease the likelihood.

TABLE 2

OLS ESTIMATES FOR HOURS AND LABOR FORCE PARTICIPATION: SUPPLY EQUATIONS

Independent Variables	Dependent Variables: Hours Worked Last Week		Dependent Variables: In the Labor Force (1=yes)	
Wage rate ($)	2.13****		.0068****	
Work values	.297**	(.233)	.0125**	(.00977)
School rating index	- .287*	(-.191)	-.00591	(-.00393)
Deportment index	- .0568*	(-.227)	-.00258**	(-.0103)
College expectation, grade 10	- .669****	(-.371)	-.0194**	(-.0108)
Interest in school (1=yes)	-1.14****	(-.548)	-.0239***	(-.0115)
Hours worked per week last summer	.103****		.00162****	
Hours worked per week last school year	.186****		.00426****	
R-square	.1489****		.0685****	

NOTES: Probabilities are for two-tailed test.

Coefficients outside parentheses are unstandardized OLS estimates. Those enclosed in parentheses are standardized by matching the standard deviation to the standard deviation of wage.

Variables included in both equations for which coefficeints are not reported in the tables are: Race, ethnicity, gender, father's occupational status, mother's occupational status, father's education, mother's education, log of family income, father in the household, number of siblings, born in U.S., live in the same household with one's own child, mother's work history, vocabulary test score, reading test score, math test score, attendance at a private school, attendance at a vocational school, presence of minimum competency testing in the school, school participation in CETA, school participation in COOP education, school participation in work study, and attendence at a school that is under court order to desegregate.

\+ $p \leq .10$
* $p \leq .05$
** $p \leq .01$
*** $p \leq .001$
**** $p \leq .0001$

Taken at face value, these results have clear implications for policies aimed at encouraging youth to work part-time during their secondary schooling. If these estimates are taken as approximations of fundamental causal parameters, then youth can be enticed to increase their labor supply by increasing the wage, increasing their attachment to the work ethic, or decreasing their valuation of schooling. Increasing the wage is not easy to implement and probably would interfere with market mechanisms even more seriously than does the current minimum wage. Most policymakers probably would agree that increasing adherence to the work ethic is desirable. Policies designed to achieve this outcome could be implemented through the schools. Policies to decrease youths' valuation of schooling, however, undoubtedly would encounter stiff resistence. It is difficult to gauge the ultimate consequences of such policies.

Table 3 displays coefficients for a wage and an unemployment equation, interpreted as demand equations. The table reports estimates only for selected variables; again, all other variables included in the equations are listed in the notes to the table. The results stand in marked contrast to the findings for the model of labor supply. The school characteristics comprise the primary variables identified as affecting demand. Socially desirable school characteristics should have positive effects on wage and negative effects on unemployment. The school means of father's occupational status and of family income do exhibit significant positive effects on wage, as expected. Also, the administrator school quality index has a statistically significant negative effect on unemployment, the remaining coefficients are either not significant or exhibit the wrong sign, although the school mean of father's occupational status has a nearly significant negative effect on unemployment.

Two of the coefficients are particularly difficult to reconcile with a priori expectation. Black enrollment percentage has a significant positive effect on wage, and the school mean of the deportment index has a significant negative effect. Black enrollment percentage possibly is picking up effects of some unmeasured characteristic of geographic location such as urbanization. The negative effect of school mean of deportment may be due to unanticipated supply effects of school quality. Those attending schools in which deportment conforms to the norms may be more attached to school and less attached to work. This interpretation would be more reasonable in an equation for hours or labor force participation, however.

Two Stage Least Squares Estimates for Hours and Wage

Hours, wage, and the attitudinal variables used as proxies for nonmonetary rewards of work and valuation of schooling possibly form an endogenous system. Consequently, two stage least squares estimates of supply and demand effects are examined in this section. Again, the hours equation is interpreted as primarily a supply equation and the wage equation as reflecting demand. Specifications of these two equations closely parallel specifications of the OLS equations for hours and wage. The only differences are that both hours and work values are included in the wage equation for the two stage

TABLE 3

OLS ESTIMATES FOR WAGE AND UNEMPLOYMENT:
DEMAND EQUATIONS

Independent Variables	Dependent Variables	
	Wage	Unemployment
School mean--father's occupation	.0220***	-.00545+
School mean--mother's occupation	-.00662	.000251
School mean--family income	.00621**	.00142
Hispanic enrollment percentage	-.000413	.000253
Black enrollment percentage	.000109**	-.0000382
Log of per pupil expenditure	-.00335	-.00376
Administrator school quality index	-.00910	-.0227*
School mean--school rating index	-.00761	.00186
School mean--deportment index	-.00967****	.000517
School mean--sophomore rating index	.0328	.0354
Hours worked per week last summer	.00981****	-.00320****
Hours worked per last week last school year	.00568****	-.00237****
R-square	.1475****	.0548****

NOTES: Probabilities are for two-tailed test.

Variables included in both equations for which coefficients are not included in the table are: Race, ethnicity, gender, father's occupational status, mother's occupational status, father's education, mother's education, log of family income, father in the household, number of siblings, born in U.S., live in the same household with one's own child, mother's work history, eight regional dummy variables, log of high school size, attendance at a private school, attendance at a vocational school, presence of minimum competency testing in the school, school participation in CETA, school participation in COOP education, school participation in work study, and attendence at a school that is under court order to desegregate.

+ $p \leq .10$
* $p \leq .05$
** $p \leq .01$
*** $p \leq .001$
**** $p \leq .0001$

estimates but were excluded from the OLS estimates. The full specification of the hours and wage equations is shown in the following tabulation:

	Hours (supply)	Wage (demand)
Endogenous Variables		
Hours worked last week		*
Wage	*	
Work values	*	*
School rating	*	
Deportment	*	
College expectations	*	
Interest in school	*	
Predetermined Variables		
Mean of school rating index		*
Mean of department index		*
Mean of sophomore school quality index		*
Administrator school quality index		*
Mean of father's occupation		*
Mean of mother's occupation		*
Mean of family income		*
Hispanic enrollment percentage		*
Black enrollment percentage		*
Log of per pupil expenditure		*
Personal characteristics (race, sex, ethnicity)	*	*
Regional dummy variables		*
Socioeconomic background	*	*
Work experience (lagged hours)	*	*
Test scores	*	
Policy relevant variables	*	*

The asterisks indicate that the variable is included in the equation, with rows indicating independent variables and columns corresponding to dependent variables. Several variables on the rows of the tabulation are indicated by the category into which they are classified in table 1. Whenever a category title appears, all variables in the category are referenced.

The reasons for including hours in the wage equation were detailed previously. Briefly, it is argued that modest efficiencies accrue to employers when workers are willing to work relatively many hours, so that employers tend to select youth who are willing to work many hours into the higher paying jobs. The reason for including work values in the wage equation is that employers probably prefer youth who strongly adhere to the work ethic over those who don't. Since valuation of schooling is not so directly related to work activities, employers tend to be indifferent to these attitudes. Hence, the proxies for valuation of schooling are omitted from the wage (demand)

equation. Reasons for including the school characteristics in the demand equation and excluding them from the supply equation are reviewed in the theoretical framework and are too lengthy to repeat here. Most of the remaining variables are included in both equations as "control" variables. It is difficult to identify appropriate exclusions from the demand equation. The three test scores were excluded on the grounds that employers do not have ready access to test results and most jobs in the youth labor market are not intellectually demanding (Greenberger, Steinberg, and Ruggiero 1982).

Two stage least squares estimates for variables of primary interest are shown in table 4. The hours equation again reflects fairly well the supply theory laid out in the theoretical framework, although the results are not as clear cut as in the OLS estimates. Both wage and work values have strong positive effects on hours. Contrary to the OLS estimates, however, the effect of work values is substantially larger than the effect of wage, even when the scales are matched (standardized coefficients in parentheses). Results for the school valuation proxies do not lend as strong support for the theory in the 2SLS estimates as in the OLS estimates. Three of these four proxies are not statistically significant and have the wrong sign. The effect of college expectation at grade ten is strongly negative and highly significant, however, as predicted. On balance, the data do tend to support the supply theory.

The two stage least squares estimates indicate that neither hours nor work values has a significant effect on wage. Thus, the assumptions that these variables do not appear in the demand equation are supported. None of the school characteristics exhibits a statistically significant coefficient in the wage equation. Thus, the theory that employers use school characteristics to evaluate the quality of individual youth is further undermined. It is possible that several school characteristics indicative of school quality appear in both the supply and demand equations with opposite signs. High quality schools may tend to increase the demand for those attending them but decrease the supply, as noted previously. If so, more sophisticated technology is needed to separate the supply and demand components. Switching regression possibly could be applied for this purpose (Judge et al. 1981).

Effects of Policy Related Variables

This subsection examines estimates of effects of variables that are of interest in policy discussions. These variables include all variables classified as policy relevant in table 1. As a group, they describe characteristics of schools that are affected by deliberate policy decisions, such as participation in CETA and school desegregation. Additionally, since equity regarding the opportunities of members of minority groups and females continues to be debated in political forums, effects of race, ethnicity, and gender are presented.

Table 5 contains the effect estimates. The coefficients were estimated by OLS using precisely the same specifications in each equation as those used in table 2 and table 3. Of the personal characteristics, race has the most consistent impact. Significant negative coefficients on race appear in the

TABLE 4

TWO STAGE LEAST SQUARES ESTIMATES FOR
HOURS AND WAGE: SUPPLY AND DEMAND EQUATIONS

Independent Variables	Dependent Variables: Hours Last Week (Supply)	Dependent Variables: Wage Rate ($) (Demand)
Hours worked last week	--	-.102 (-1.40)
Wage rate ($)	6.50****	--
Work values	14.3**** (11.2)	-.803 (- .630)
School rating index	.0857 (.0570)	--
Deportment index	.100 (.402)	--
College expectation, grade 10	-10.2**** (-5.66)	--
Interest in school (1=yes)	1.58 (.761)	--
School mean--father's occupation	--	.0413
School mean--mother's occupation	--	-.0162
School mean--family income	--	.00145
Hispanic enrollment percentage	--	-.00301
Black enrollment percentage	--	.00192
Log of per pupil expenditure	--	-.0153
Administrator school quality index	--	.0316
School mean--school rating index	--	-.0881
School mean--deportment index	--	-.00890
School mean--sophomore rating index	--	-.167
Hours worked per wk last summer	.0343*	.0245
Hours worked per wk last sch year	.143****	.0267
R-square	.0734****	.0427****
Mean square error	238.	2.60

NOTES: Probabilities are for two-tailed test.

Coefficients not enclosed in parentheses are unstandardized 2SLS estimates. Coefficients enclosed in parentheses are standardized by matching the standard deviation to the standard deviation of the wage scale.

Mean square errors are calculated by applying 2SLS estimates to observed values of the endogenous variables. R-squares are calculated with predicted values of endogenous variable.

\+ $p \leq .10$
* $p < .05$
** $p < .01$
*** $p < .001$
**** $p \leq .0001$

TABLE 5

OLS ESTIMATES OF EFFECTS OF POLICY RELATED VARIABLES

Independent Variables	Dependent Variables: Hours Last Week	In the Labor Force (1=yes)	Wage ($)	Unemployment (1=yes)
Race (1=black)	-3.51****	-.0296**	-.0481*	.131****
Ethnicity (1=Hispanic)	-1.15****	-.0219**	.0193	.0235**
Gender (1=female)	.606***	.0474****	-.340****	-.0176**
Private school (1=yes)	-1.00***	-.0107	.126****	.0172
Vocational school (1=yes)	- .129	-.0152	.130**	-.0189
Minimum competency test	.0883	-.0113**	-.00210	.00250
School participates in CETA (1=yes)	- .378+	-.0110	-.00554	.00588
School participates in co-op (1=yes)	.419*	.0231**	.0381*	-.00644
School part in work study (1-yes)	.739***	.0264***	.00235	.0221**
Sch is under deseg court order (1=yes)	.487*	-.00115	.0674****	-.00980
R-square	.1489****	.0685****	.1475****	.0548****

NOTES: Probabilities are for two-tailed test.

Coefficients are unstandardized OLS estimates with the same specifications indicated in table 2 and table 3.

\+ $p \leq .10$
* $p \leq .05$
** $p \leq .01$
*** $p \leq .001$
**** $p \leq .0001$

hours, labor force participation, and wage equations, and a significant positive effect occurs on unemployment. Black youth average about three and a half fewer hours worked per week. They are about 3 percent less likely to be in the labor force. They earn approximately five cents an hour less. By far the most important disadvantage of being black, however, is in the increased chance of being unemployed. Even in the presence of controls for background, ability, location, and school characteristics, forty variables in total, blacks still encounter a 13 percent higher rate of unemployment. Although uncontrolled variation in local economic characteristics may account for a portion of this effect, it is unlikely that the race effect on unemployment would be substantially reduced by introduction of controls for local labor market characteristics. It is difficult to avoid the conclusion that economic discrimination persists against hiring black youth. By comparison to blacks, the disadvantage of Hispanic youth is moderate. They work about one hour less per week than non-Hispanics, are about 2 percent less likely to be in the labor force, and earn about two cents an hour less, though the latter coefficient is not significant. Hispanics also are about 2 percent more likely to be unemployed, ceteris paribus. Females encounter a large wage disadvantage, thirty-four cents an hour, but this result may be due to the tendency among teenage women to work as babysitters. Females work slightly more hours, are somewhat more likely to be in the labor force, and are a little less likely to be unemployed than males. None of these effects is large, however.

Among the school variables that are related to policy, attending a private school or a school that participates in CETA tends to reduce the number of hours worked per week. Attending a school that participates in co-op or work study, or a school that is under a court order to desegregate tends to increase hours worked. Attending a school with minimum competency tests tends to reduce the chance of being in the labor force. Attending a school that participates in co-op or work study increases the likelihood of being in the labor force.

Attending a vocational high school increases one's wage about thirteen cents an hour. This is an encouraging sign, since vocational schools are designed to improve the employability of their students. Attending a private high school, a school that participates in co-op, or a school that is under court order to desegregate, also increases one's wage. The only one of these school variables that has a statistically significant effect on unemployment is work study. Those attending a school that participates in work study are slightly more likely to be unemployed. This fact probably is due to the increased chance of being in the labor force if one attends a school that participates in work study (i.e., gives release time from school to employed youth).

Generally, the pattern of significant effects associated with these school variables is interpretable. Those attending private schools tend to work less, possibly due to the heavier homework loads carried by these students (Coleman, Hoffer, and Kilgore 1982). At first glance it may seem unlikely that students attending schools that participate in CETA tend to work less. The effect is quite small (less than half an hour per week) and not quite statistically significant ($p \leq .0647$), however. The small negative

effect probably is due to the fact that CETA students frequently are paid for in-school activities. That students attending schools that participate in co-op and work study work slightly more, are slightly more likely to be in the labor force, and earn a slightly higher wage is sensible. The positive effects on hours and wage associated with attending a school under a court order to desegregate are somewhat difficult to interpret. These effects may be due to geographic clustering of desegregation orders that are not fully captured by the regional dummy variables. In any case, it is encouraging to find that desegregation does not produce undesirable side effects on student's part-time work experience.

SUMMARY AND DISCUSSION

The original goal of this study was to examine effects of school variables on work behavior and outcomes of youth attending secondary school. The motivation was to identify school characteristics that promote desirable work outcomes with the idea of identifying potential points of policy intervention. Adequate identification of school effects, however, depends on good theory explaining the processes that generate work outcomes. Consequently, this paper develops a formal model of factors affecting labor supply of teenagers attending school and sketches a theory of demand for teenagers in the youth labor market.

The model of labor supply views work, school, and leisure as primary competitors for students' time, with particular emphasis on work and school. It is deduced from a utility model that wage and indicators of nonwage benefits of work exercise positive effects on hours of work offered and that indicators of valuation of schooling exercise negative effects on hours. The demand theory is used to justify the expectation that "school quality" and other school characteristics influence employer demand for student workers. It is assumed that employers prefer youth from "high-quality" schools and youth who attend schools with high socioeconomic profiles and low percentage of minority students.

Separating supply and demand effects in empirical analyses containing only observed hours worked poses serious difficulties in the statistical analyses. In this paper it is assumed that an equation for hours and an equation for labor force participation reflect supply mechanisms. A wage equation and an equation for unemployment are assumed to reflect demand effects. Two estimation strategies are pursued. First, ordinary least squares estimates of all four equations are examined, with the assumptions that wage is exogenous to supply of hours, that current hours do not appear in the wage equation, and that all other variables in the model are predetermined with respect to hours and wage. Parallel specifications are used in the equations for labor force participation and unemployment. The second strategy is to use two stage least squares. The two stage least squares estimates are based on the assumptions that hours, wage, and attitudinal variables indicative of nonmonetary benefits of work and valuation of schooling are endogenous.

The results tend to support the supply theory. The variables associated with supply are statistically significant and display expected signs in the

OLS estimates, and the significant effects in the two-stage estimates also exhibit the expected signs. Both wage and a proxy for nonwage compensation for work have positive effects on supply, and valuation of schooling has a negative effect. In contrast, the school effects derived from demand theory are not supported by the data. The indexes of "school quality" constructed as school means of student reports show no effects or negative effects on employment outcomes. On the other hand, there is some evidence that the index constructed from administrator opinions has a negative effect on unemployment. Effects of school demographics and SES context do not conform consistently to demand theory.

The measures of school characteristics in this study all were derived from students or school administrators. A more adequate source of data is employer perceptions of school quality or reputation. Employer data, of course, would be prohibitively expensive to collect for a national sample such as the HSB; a local sample is a more practical beginning point. In fact, the National Center has been collecting local data in the Employer Hiring Decisions Study that is pertinent to the issue of school effects. Michael Crowe[6] reports evidence from extensive group discussions with representatives of local companies who are responsible for hiring practices. There appears to be a firmly held view among the company representatives that school reputation is important in hiring decisions. While employers generally prefer youth from schools with a reputation for high quality, the effects of school reputation are complex. First, school effects are mediated by personal linkages between school personnel and company representatives. Apparently, close linkages can compensate for a poor general reputation of a school. Second, some employer representatives expressed reservations against hiring youth from the most prestigeous schools for low-level jobs, because the expectations of youth from those schools tend to be unrealistically high.

The contradiction between opinions of company officials and the findings in the HSB data may be due in part to the fact that the participating company officials were expressing opinions about out-of-school youth who would apply for full time work, whereas the HSB data describe part-time work while attending school. Students working part-time probably are unwilling to travel as far to and from work as are full-time employees who are not in school. First, time commitment to school leaves less time for travel to and from work. Second, travel is a cost of working, and earnings from part-time jobs minus travel costs may not justify long journeys to and from the work site. Finally, most high school students live with their parents and therefore are less likely to change their residences in order to be close to the work site. Consequently, employers of high school students may be faced with a pool of potential employees who attend schools within a limited geographic range. Assuming that school quality tends to be homogeneous within limited geographical boundries, then, it may not be possible to use school characteristics as major determinants of demand for high-school workers.

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6. Michael Crowe, research specialist, the National Center for Research in Vocational Education, The Ohio State University, personal conversation, 1982.

The difficulty of separating supply from demand effects also may account for the negative findings regarding school characteristics. If, as predicted by the supply model developed in this paper, valuation of schooling is negatively related to labor supply (hours of worked offered), and school quality has a positive effect on valuation of schooling, then the negative or zero effects observed for the student indexes of school quality may be due to an indirect effect on supply. Preliminary tests of this intervening variable hypotheses (not tabulated) using the Alwin Hauser (1975) procedures lend some support to it.

Both supply and demand theory indicate that personal characteristics, race, ethnicity, and gender influence work outcomes. Control for attitudinal measures should diminish the supply side effects, however, so the emphasis is on demand-side effects. The data analyses turn up persistent effects of the personal characteristics. The effects of race are particularly pervasive. To be black is a disadvantage on all counts (hours worked, labor force participation, wage, and unemployment). Hispanics also are at a disadvantage, but the effects of being Hispanic are not nearly as strong as the race effects. The most important effect of gender is on wage; females earn a lower wage. It seems likely that the disadvantages encountered by blacks and Hispanics are due largely to discrimination. This conclusion, however, rests on the assumption that race and ethnicity are demand-side effects. Given the difficulty in separating supply from demand effects in this paper and the absence of data on local labor market characteristics, therefore, it is impossible to attribute effects of personal characteristics solely to discrimination. The discrimination hypothesis is especially weak with respect to gender effects on wage, since females may take low paying babysitting jobs because of reasons of personal taste.

This report also examines briefly the effects of several school variables that are closely related to policy, including vocational vs. nonvocational high schools, private vs. public schools, school participation in CETA, co-op education, work study, and presence or absence of court-ordered desegregation. Three findings are particularly interesting. Attendance at a vocational school increases one's wage rate. Attendance at a private school also increases one's wage rate. Court-ordered desegregation has no undesirable effects on student outcomes in the part-time labor market and may, in fact, be associated with a somewhat higher wage rate and a tendency to work more.

The effects of the policy variables are not large and, therefore, may be difficult to replicate in samples smaller than the HSB. Further, the models used to assess the effects of policy variables are taken from the theoretical framework presented in this paper; therefore, confidence in empirical estimates of effects of the policy variables is intimately tied up with confidence in the underlying theory. Given the tentative specifications of the theory and uneven empirical support for it, the findings regarding the policy variables must be interpreted cautiously. This conclusion, we believe, illustrates a very general characteristic of policy research. The usefulness of policy conclusions rests heavily on the adequacy of the basic theory describing the key variables in the analysis.

In conclusion, this report presents useful first steps toward understanding processes that shape employment outcomes of high school students. The theoretical framework and empirical findings provide important context for continued research. Two immediate next steps include use of longitudinal data and data describing local labor markets. The longitudinal data can help to identify the statistical estimation equations and will stimulate expansion of the theoretical model to describe processes of change over time. Access to data on local labor market characteristics will fill an important gap in the demand side of the equation.

Even with longitudinal data and good information on local labor markets, however, fundamental conceptual issues remain unresolved. The most important of these is the distinction between supply and demand effects on employment outcomes. In principle, the conceptual distinction is fairly clear: supply is the amount of work time desired by workers and prospective workers, and demand is the amount of work time desired from workers by employers. The difficulties arise because separate data for work time supplied and work time demanded generally are not available. Observations are taken only on the observed number of hours worked. Estimates of effects on labor supplied and labor demanded might be improved with data in which the two effects are not mixed, as they are in observed hours of work. Survey data in which individuals are asked to indicate desired number of work hours under varying circumstances might be useful in estimating supply functions, and analogous data from employers might aid in estimating demand functions. Measurement error might pose a serious threat to the accuracy of such estimates, however. Application of switching regression also might help to separate supply and demand effects. Another possibility is to refine the definition of labor force participation and unemployment variables and develop supply models of labor force participation and demand models of unemployment--on the assumptions that labor force participation (properly defined) is a supply decision and unemployment (properly defined) is due to slack demand. A combination of these approaches and other strategies undoubtedly is needed.

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